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STRATEGY TEMPLATES FOR EFFECTS BASED OPERATIONS

ISX Corporation

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13. ABSTRACT ***(Maximum 200 Words)***

Effects-Based Operations (EBO) is an approach for military planning, execution and assessment that focuses on predicting and assessing what physical actions produce the desired behavioral effects to gain control over an adversary. The Strategy Templates project is aimed at developing tools to provide functional capabilities that will extend the efficacy of the EBO Strategy Development Tool. Generally, EBO Strategy Templates are intended to implement different command strategies using different mechanisms to achieve unique end states. The software resulting from this effort provides the ability to: a) Retrieve pre-built models representing strategic planning from a library of stored templates; b) Specialize and adapt those templates to fit a specific strategic planning problem; c) Build new templates and assess their "fit" to the current C2 activity. A software demonstration for illustrating strategy templates was developed and integrated with other EBO software. Studies were conducted to investigate opportunities for this extended tool set to facilitate applications that support the strategy planning needs of Air Force, Joint Operations, Army and Navy effects-based operations.

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Preface and Acknowledgments

This report is the final report summarizing the results of the effort expended by the ISX team in support of contract F30602-01-C-0198**.** The efforts described herein were built on and integrated into a concurrent SBIR Phase II Contract F30602-00-C-0095.

The work described herein includes government supported subject matter expertise supplied by Dr. Maris McCrabb and other personnel at AFRL.

1. Summary

The objective of this effort was to develop a prototype software tool to demonstrate the value of using Strategy Templates to compose an effects-based plan. The software components search for and retrieve appropriate Templates (skeletal plans) from a repository. This effort resulted in a representation for generalized strategy templates that allows re-use of strategy models across multiple domains and situations. User-centered development techniques were implemented in which a series of concept mockups were developed. Potential end-users and subject matter experts exercised the mock-ups during the development process. This resulted in a model for strategy template tools and use cases and guided tool design and implementation. A prototype tool to create strategy templates resulted. The tool provides the means to build a repository of strategy templates, to store and retrieve templates within the repository, to create effects-based plans by applying selected strategy templates, and to visualize and analyze template-based plans.

2. Introduction

Meeting the national security challenges of the 21st Century will levy increasingly challenging requirements on operational level C2. Some of the more stringent requirements are: the need to quickly employ forces; to quickly, decisively and at minimal cost accomplish commander's intent; portray as accurately and as timely as possible the progress towards attaining commander's intent; and achieve as much of the commander's intent as possible given the dynamically changing resources. It is possible that as little as a few hours will be available to prepare executable Courses Of Action (COAs) for a campaign. Current target-based, periodic-process procedures and tools are inadequate, both in the timeliness of their planning processes and in their ability to deal with the complexity of effects-based planning. To overcome the limitations of current planning, execution and assessment processes, AFRL initiated the EBO Advanced Technology Demonstration (ATD) initiative.

Like target-based or objective-based approaches, effects-based operations start with receipt of the commander's intent and thereupon various COA options are developed. EBO planning allows for the inclusion of causality between actions and effects, with an explicit focus on how physical actions lead to desired behavioral effects. There are feedback loops for both combat and operational assessment of enemy reaction and a determination of the resulting cumulative and operational effects. Analysis using Center of Gravity (COG) modeling and the Campaign Assessment Tool is particularly important to EBO because an enemy is modeled as a system of specified interactions, and planners can trace direct and indirect effects throughout the battlespace. A crucial element in effects-based operations is the ability to associate physical actions leading to modification of behavior in the enemy system within a timeline consistent with commander's intent, mission statement, or COA.

Planning in support of EBO offers distinct advantages over current planning capabilities. Target-based approaches can be planned, executed and assessed fairly well though not dynamically. Objectives-based approaches can be planned, at least in a limited manner, and executed but not assessed and not dynamically. The EBO approach, using the dynamic tasking vision, allows continuous or periodic, effects-based, objectives-based or target-based approaches, based on the commander's desire, across the tasks of planning, execution, and assessment. EBO is well matched to mission and strategy options that are based on strategies other than attrition.

Strategy templates provide reusable strategic knowledge to aid the rapid creation of a coherent effects-based plan to implement commander's intent within the context of the specific planning situation. Through the exploitation of domain planning knowledge embedded within these strategy templates, effects-based planning will offer more focused planning, allowing discriminate use of force precisely applied against the key links and nodes that provide the most influential effects.

To maximize the results of this research, the strategy template tools built on the results of our related EBO work, which is being performed under SBIR contract and which contributes to the AFRL EBO ATD. Specifically, template authoring is performed with a modified version of our plan authoring tools, which are known as Effector, while the results of reusing templates are plans that are visualized and further refined in Effector. A demonstration version of these tools can be found at http://ebo.isx.com. A screenshot of ISX Effector is shown in Figure 1.

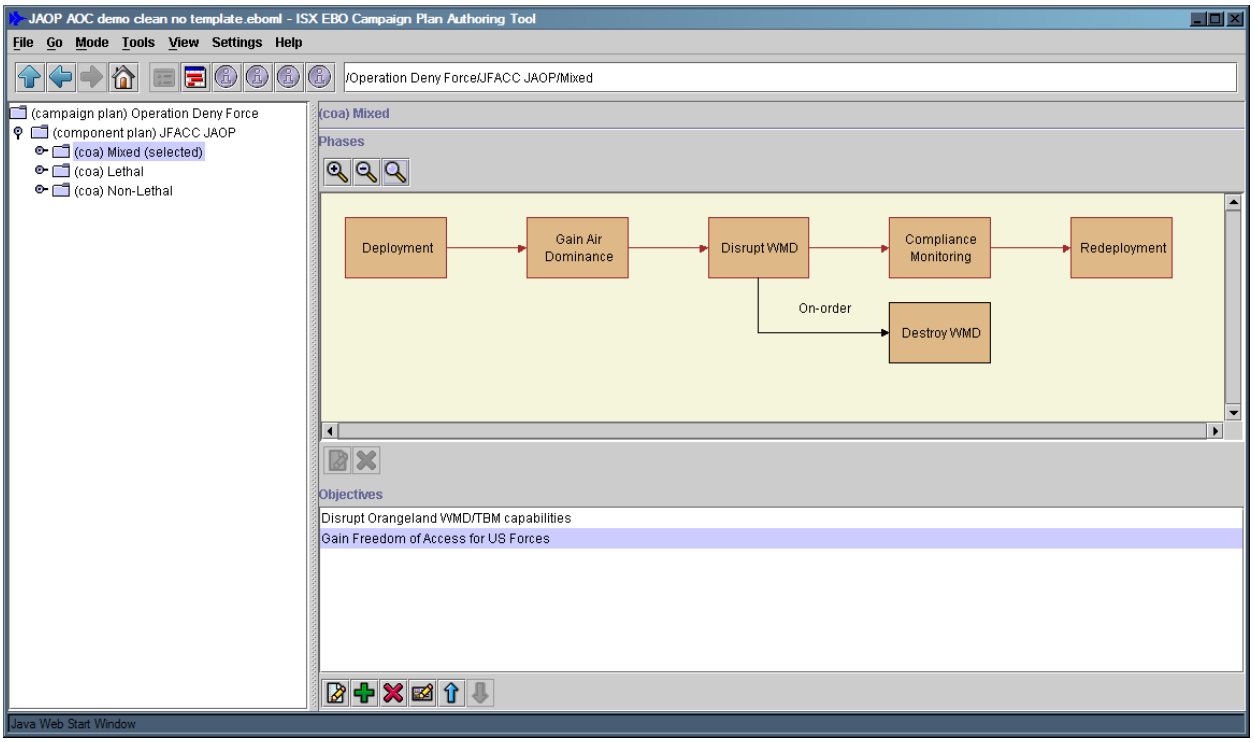

Figure 1. ISX Effector Visualizing The Phasing of a Plan

3. Purpose

The purpose of this effort is to build a tool for authoring, executing and assessing effects based plans using strategy templates. The objective includes integrating the results of this study into the EBO Strategy Development Tools (SDT) under development by AFRL. Assessment of the technology developed was performed as part of the SDT assessment process.

4. Benefits

In the new age of war, the precision application of aerospace power has become a primary mechanism for achieving strategic effect. It is applied to key targets chosen for their ability to trigger specific desired effects on the enemy with minimal application of force, minimal risk to US forces, and minimal risk of unintended consequences. The Air Force has made great advances in command and control processes to achieve this paradigm. Beginning with the emergence of "Strategy-to-Task" planning, the strategic command of air operations has moved away from simply developing a master list of targets and prioritizing that list based on the general "level of impact" that target destruction would inflict on the enemy's war-fighting capability. Instead, the focus is on producing specific effects to achieve specific strategic objectives.

EBO refines the concepts in strategy-to-task, emphasizing an understanding of friendly and enemy systems, causal linkages between actions and effects, and the full range of direct, indirect, and cascading effects, including military, diplomatic, economic, and psychological. This process is not new, and good planners have always used effect-based concepts. However, this research looked at capturing and refining the process for repeatability. It considered plans and strategies as a "corporate asset" and provided the tools for the Air Force to capture, manage, retrieve and apply that asset. Strategy Templates are the means by which this repeatability is implemented. They are situation-independent abstractions of strategies that can be applied to a variety of situations in order to rapidly generate course of action options.

5. Methods, Assumptions, and Procedures

The methodology used in the Strategy Template study is shown in Figure 2. The short duration of this program required that we collapse into three phases: 1) Definition and Requirements, 2) Design and Implementation Plan, 3) Development and Integration. The final stage of developing, refining, and applying actual strategies using templates was not performed under this project.

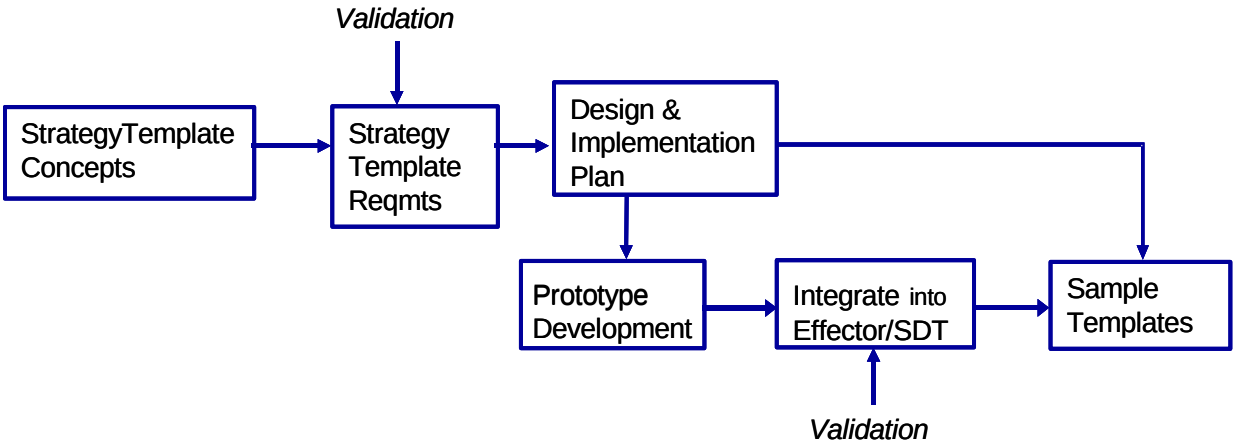

Figure 2. Methodology of Study

Subject matter expert Dr. Buster McCrabb validated the strategy template requirements and reviewed the final prototype implementation in the Effector Tools. The full suite of capability for Strategy Templates was integrated into Strategy Development Tools by the integrator, ALPHATECH, Inc., later in 2002.

5.1 Strategy Template Definitions and Requirements

The first task was to develop and refine the functional concepts for Strategy Templates. To do this ISX worked together with the government and the government-provided subject matter expert to identify the application requirements for a "full life cycle" of an EBO planning system that incorporates strategy templates. Some of those life-cycle requirements related to concepts for repository management, including search and retrieve functions. Other requirements were derived from the life cycle of the campaign plan objects themselves, for instance, the EBO triple of effect-mechanisms-tasks as they support campaign phases.

The last set of requirements was derived from the "stages" of the planning process. These stages were defined as: Operational Environment Research (OER), Objective Determination (OD), Strategy Identification (SI), Center of Gravity Identification (COGI), and Joint Aerospace Operations Plan Development (JAOPD). Predictive Battlespace Awareness with OER was applicable to the requirements associated with abstractions needed in Strategy Templates (Section 6.1). During the planning process in OER, the planner considers multiple strategies needed to achieve effects on the adversary behavior. Strategy Templates were defined as the tool available for OER. In the OD stage, the planner decomposes the objectives and desired effects into details, with mechanisms, and objects of effect. At this stage, tools are required to help the planner envision and evaluate the strategy, as represented in the abstract template, but now applied for the entities given within the specific battlespace. Those tools support planners in searching for and retrieving templates, and give planners the ability to piece together partial plans created through multiple templates. In the SI stage, strategy templates overlap with mission templates[*], depending on the level of detail. The COGI and JAOPD stages were not addressed in our research.

The successful concept of Strategy Templates requires tools for both Template Authors and Template Users. In this concept, template authors are defined as producers of effects-based strategy and capture that strategy in strategy templates.

5.1.1 Template Authoring Requirements

It is assumed that the authors will capture the strategy in terms of effects, mechanisms, and actions. The requirements for capturing the strategy using the EBO process were satisfied by the use of the AFRL Strategy Development Tools. Specifically, the ISX Effector toolset was extended to produce Strategy Template authoring tools, which included that ability to define templates, to control the cardinality of the object-of-effect, and to provide a rich description of the effects, mechanisms and actions expected to change adversary behavior.

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[*] Mission templates are templated plan fragments for standard missions such as offensive counter air, air interdiction, and combat search and rescue [Evans et. al. 2002]. They are similar to strategy templates insofar as they are abstractions of military strategy, but their focus on standardized, lower-level missions results in slightly different requirements. Consequently, ALPHATECH, Inc., the EBO contractor investigating mission templates, has explored different technologies for their implementation.

An object-of-effect is represented at an abstraction level deemed appropriate by the author. For instance, an abstract object-of-effect may be labeled as a generic "landing strip" or more specific as "civilian airfield" or "civilian airport". A strategy template would not likely refer to a specific airfield, such as Aviano or Ramstein. In this research study, there was no specific level of abstraction pre-defined. Instead, it was decided that the author must dynamically insert this information using the authoring tools. The author's guidance is expected to help the eventual template user understand the level of abstraction, and transition that abstraction to the battlespace during application of the template. The abstraction requirements were supported by the EBO ontologies developed under our EBO SBIR effort.

5.1.2 Template User Requirements

Strategy Template users are most likely unconnected from the person that authored the template. Template users are working from the Commanders Intent, with specified and particular battlespace entities that must be reflected in the resultant plan. Templates users are the "planners" in the "planning cells" and are under the extreme pressure associated with constantly planning and assessing the battlespace.

We foresee that planners may not have full knowledge of the battlespace before starting the planning activities. Therefore, planners have overlapping needs with template authors in the ability to abstractly represent parts of the battlespace. For instance, a planner may not want to refer to specific troops but instead reference an aggregation of troops "NE of the border". However, in the transition from strategy to mission plan, the specific troops will be tasked.

5.2 Technology Design and Prototype

One of the goals of our design was to maintain web-based technology as used in the Effector tools. The basic approach is to use only Effector tools and graphical user interfaces (GUI) to represent plan elements whenever possible. This will include the EBO base ontology elements represented in strategy templates. New representations will be needed to manage and modify ontologies in support of strategy development. As well, the annotation ability within all GUIs will be reviewed.

The development plan is based on best commercial standards from W3C (World-wide Web Consortium) for web-based design and implements: Java development tools, Simple Object Access Protocol (SOAP), and DARPA Agent Markup Language (DAML). We also use common development tools, including the Apache Server and CVS for configuration management. Both commercial-off-the-shelf (COTS) and government-off-the-shelf (GOTS) tools are employed in this project. The commercial graphical toolset from ILOG and the Java Expert System Shell (JESS) from Sandia Labs are both used in the implementation.

5.3 Strategy Template Representation

ISX's strategy templates share the same object-oriented plan structures and XML representations as our standard Effector plans. They are distinguished by the fact that they refer to abstract entities instead of concrete, situation-specific entities. References to battlespace entities appear as the objects of effects and tasks in our representation. As an example, where a situation-specific plan would have as its goal to produce an isolation effect on the 141st Orangeland Infantry Regiment, a template would have as its goal to produce an isolation effect on an abstract

type, such as “enemy ground force”. Or, where a planner might build a plan for “Influence President Moomaw of Orangeland,” they could alternatively build a template for “Influence the dominant political leader of a nation.” These templates could then be applied to build a plan to isolate *any* enemy ground force or influence *any* national political leader.

5.4 Integration into SDT

As Strategy Templates components are developed, they have been integrated into Effector tools. The Effector tools have a methodology in place, via ISX SBIR contract F30602-00-C-0095, for integration into the SDT tools at AFRL.

6. Results

The Strategy Templates project was aimed at developing tools to provide functional capabilities that will extend the effectiveness of the Effects Based Operations Strategy Development Tool. Generally, EBO Strategy Templates are intended to implement different command strategies using different mechanisms to achieve unique end states. The project provides detailed approach to the design and development that provides the ability to:

a) Retrieve pre-built models representing strategies from a library of stored templates;

b) Specialize and adapt those templates to fit a specific strategic planning problem.

ISX developed prototype software for demonstration of strategy templates. The software was integrated with other EBO components developed at ISX. The results of this research were presented at the AeroSense 2003 conference [Donnelly et. al. 2003].

6.1 Doctrinal and Strategy Templates

Sample templates were developed, and used for demonstration of a template being applied to formulate an effects-based plan. One of our research objectives was to encapsulate certain strategic doctrines, such as attrition, denial, and strategic paralysis. Our subject matter expert, Dr. McCrabb experimented with the construction of such templates. A portion of his attrition template is illustrated in Figure 3[*]. However, the result of his experimentation was the realization that encapsulating such general strategies was difficult and ineffective.

[*] Note that this figure is a portion of a screenshot of the ISX Effector tool, an that in this and in all subsequent screenshots, blue parallelograms represent actions, orange rounded rectangles represent mechanisms, and green rectangles represent effects.

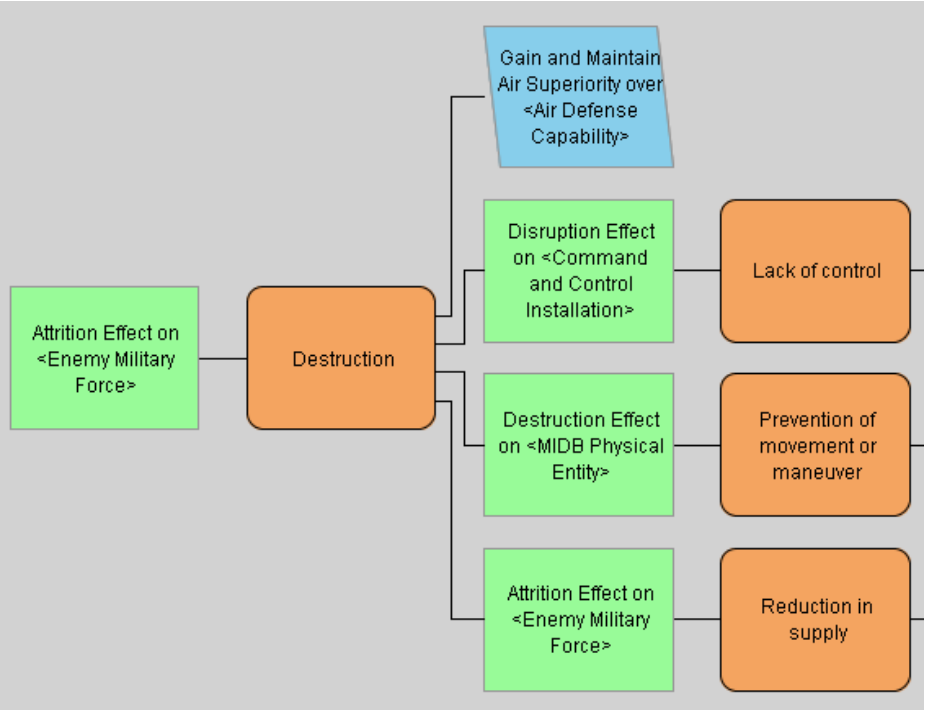

Figure 3. Doctrinal Template for Attrition

While strategy templates abstract knowledge of effective strategies, these doctrinal templates were too abstract. The most effective templates produced were ones that depended more on the details of the mechanisms and methods used to achieve goals such as denial or strategic paralysis. For example, Dr. McCrabb developed a template that encapsulates the strategy featured in his EBO CONOPS, denial by holding high-value assets at risk. Similarly, under related research, Adroit Systems Inc. developed a series of Information Warfare (IW) templates that achieved strategic effects such as disruption by applying specific IW techniques. Figure 4 is an example of this sort of template.

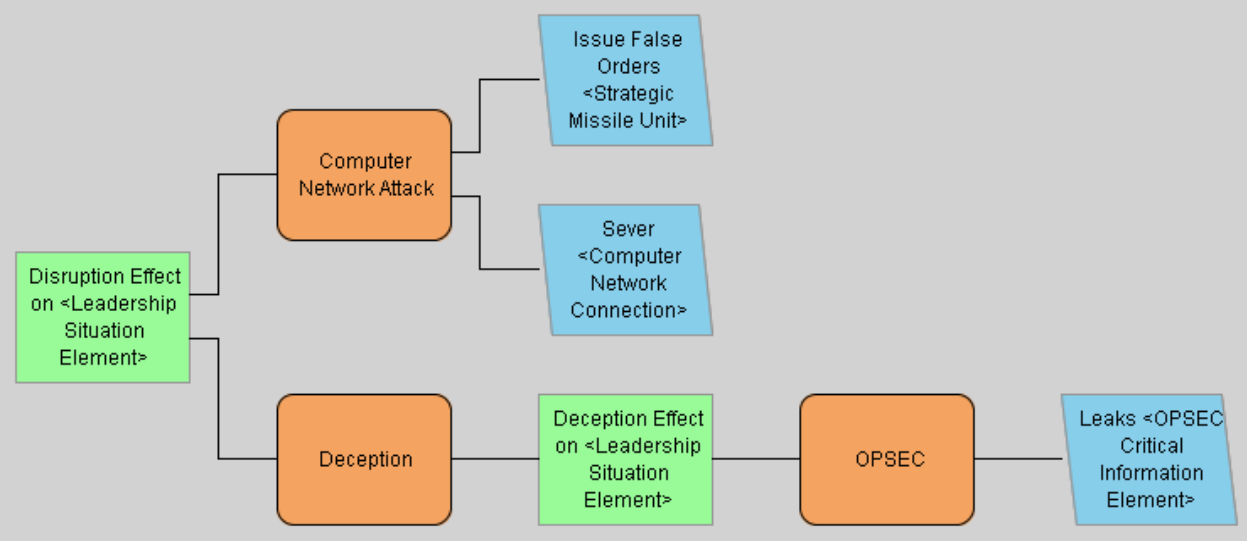

Figure 4. Information Warfare Strategy Template

What is clear at this point is that the development of strategy templates depends on abstracting away specifics of the battlespace, such as units, structures, and geographic areas, while at the same time maintaining the specifics of the strategy itself.

Further funding will be needed to proceed with research on organization and management of strategy template libraries, template validation procedures, and security related to strategy templates.

6.2 Template Authoring Tools

ISX modified the Effector toolset for the authoring of Strategy Templates. This required a new template authoring mode as well as implementing the tools for applying a strategy template and adding a strategy template into a library. All tools were added as components to the Effector Toolbar as shown in Figure 5.

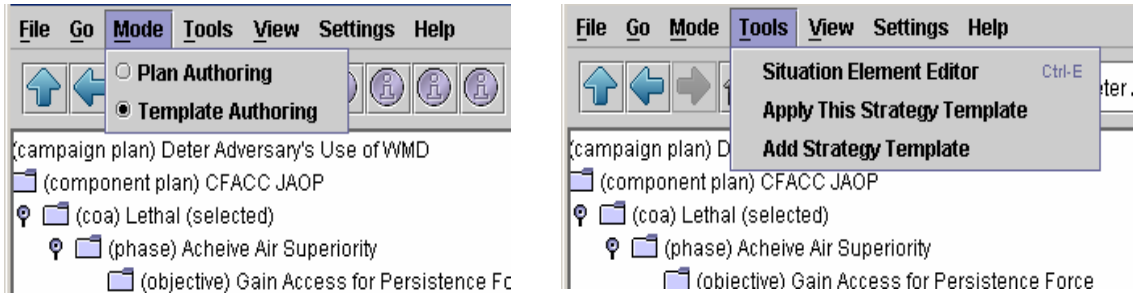

Figure 5. Strategy Template Toolbar Components

6.2.1 Graphical Template Editor

By definition, Strategy Templates are strategy abstractions for EBO. As such, they are focused on effects, mechanisms, and actions upon abstract types of elements in the battlespace, such as "Infantry Division", instead of on specific entities such as the US 10th Mountain Division. As a result, ISX modified the Effector tools to build plans whose elements refer to the types of situation elements instead of to the elements themselves. These type-based plans are the strategy templates.

The Effector toolset was designed to support planners constructing plans with as much or as little detail as available at the appropriate stage of planning. An example of using the graphical iconic plan representation in Effector is shown in Figure 6. One recognizes that a type of situation element is being referenced by the angle brackets around the name of the type, such as "<Military Capability>".

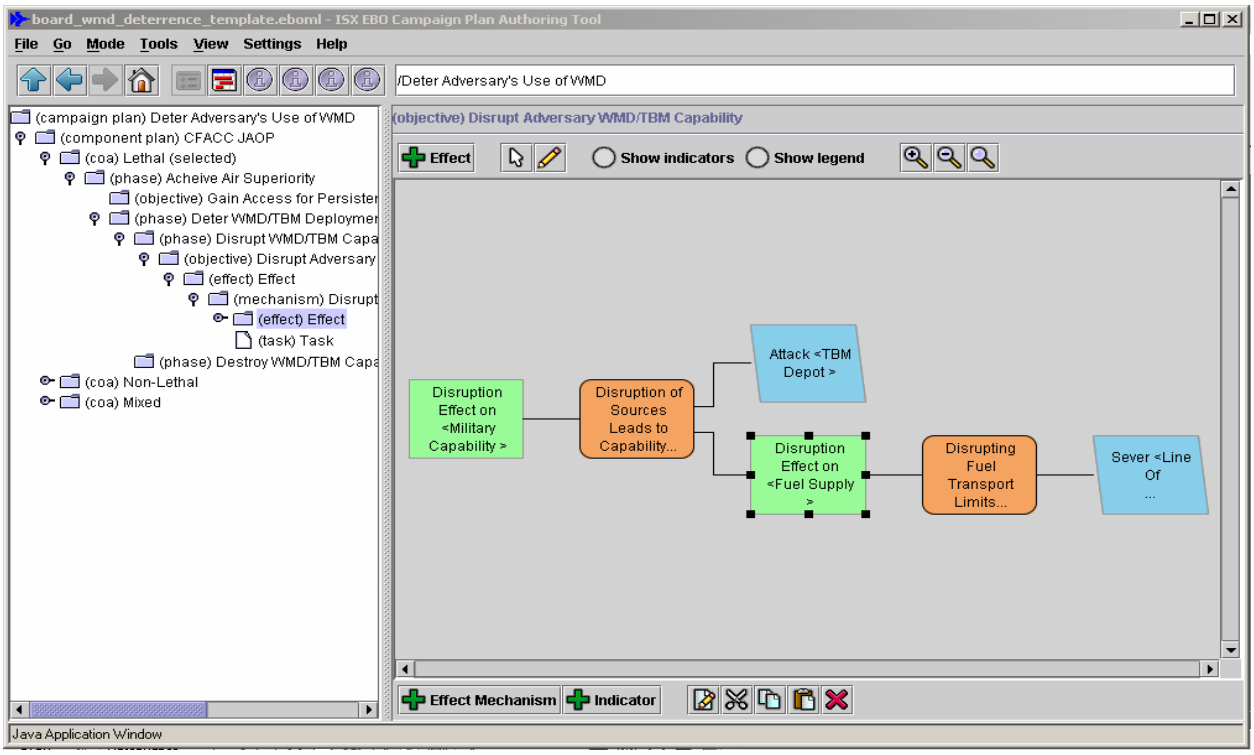

Figure 6. ISX Effector Displaying a Strategy Template

Section 6.2.3 will describe the template application wizard that is applied to a template in order to instantiate an actual plan that is appropriate for the planner's situation.

6.2.2 Strategy Template Retrieval

ISX did early research in retrieval of strategy templates. This research was in preparation of the future situation where multiple libraries of templates would be developed and made available to effects-based planning activities.

ISX adopted the common "shopping cart" paradigm, illustrated in Figure 7, where the planner collects multiple templates into the cart. The templates are organized into libraries; in the example below this is illustrated as AETF (Air Expeditionary Task Force library). Within that library, two directories were of interest to this planner: AMC (Air Mobility Command), and GSTF (Global Strike Task Force). Finally, the list of templates available in the two directories is listed. The planner may choose one or more of the available templates to be added to the cart. Alternatively, the planner may select a new search for templates as made available at the top of the window.

The planner may review the templates in the cart and down select as necessary. If multiple templates are in the cart, they will be composed into a single plan. Currently, that process is a simple successive appendage of each template into the plan that is represented in XML. The resulting plan is represented and displayed to the user in the Effector toolset. The planner may, using the Effector tools, edit and move the plan segments.

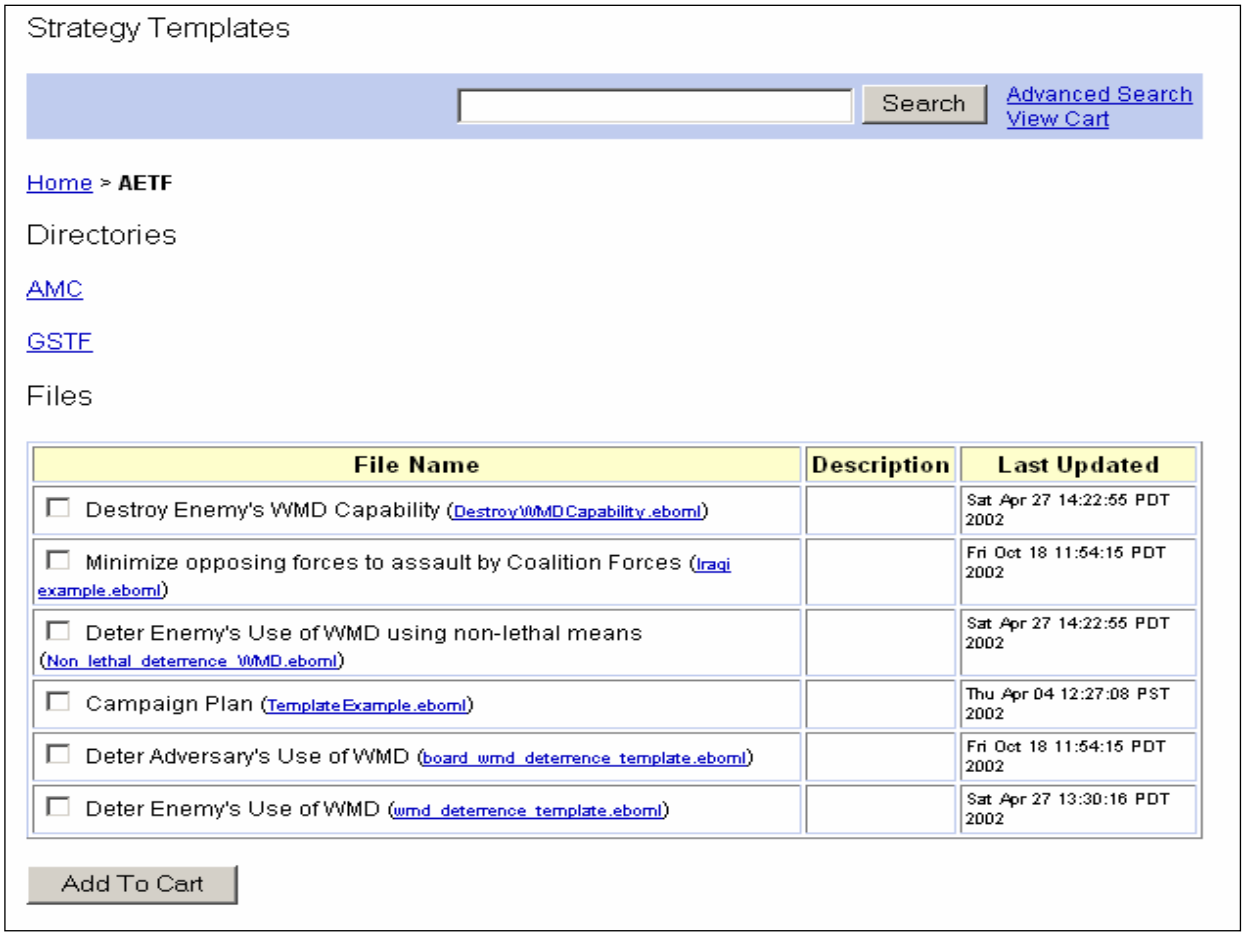

Figure 7. "Shopping Cart" for Template Selection

6.2.3 Template Application Wizard

An important part of our research and prototype development was the development of a Template Application Wizard to apply a strategy template to formulate a plan for a specific

battlespace. In other words, given all the situation elements defined in available intelligence sources, which are the appropriate objects of effect and action for the planner to implement the strategy represented in the template. The goal of the wizard was to make as transparent as possible the "laying down" of the strategy into the battlespace. The difficulties were: 1) there is no battlespace ontology concept that spans details of all planning elements, 2) the graphical tools to literally relate the battlespace "map" to a strategy were not available in this research scope, 3) ontologies lack semantics needed to help find the appropriate battlespace abstractions and elements. We did learn that such a wizard must relate the intentions of the template author to the using planner. At a minimum that required communication of a description of the effect expected upon the object of effect, the cardinality of the number of objects possible related to achieving the effect, and as selection guidance, as possible from the template author to the user, to select the specific situation element. This is done by highlighting and clicking "Select Situation Element".

An example of the application wizard for a template with a disruption effect is shown in Figure 8.

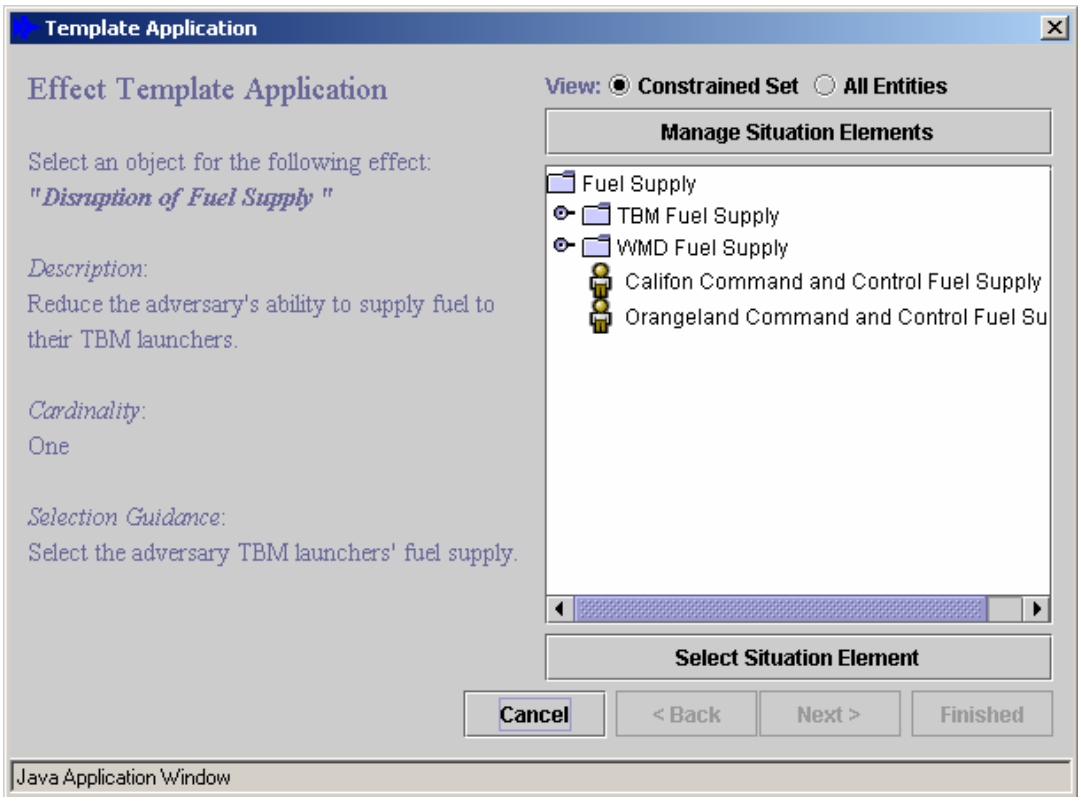

Figure 8. Template Application Wizard

6.2.4 Situation Element Editor

It would be difficult to have abstraction levels match between template and plan battlespace. Therefore, there arose a requirement to dynamically modify the current ontology from within the wizard. This feature is available by clicking "Manage Situation Element" (upper right in Figure

8). However, the wizard constrains the list of situation elements by the type of the situation element referred to in the template itself. In the example in Figure 8, the template is concerned with fuel supplies, and in the Situation Element Editor window show in Figure 9 only situation elements related to Fuel Supply are displayed.

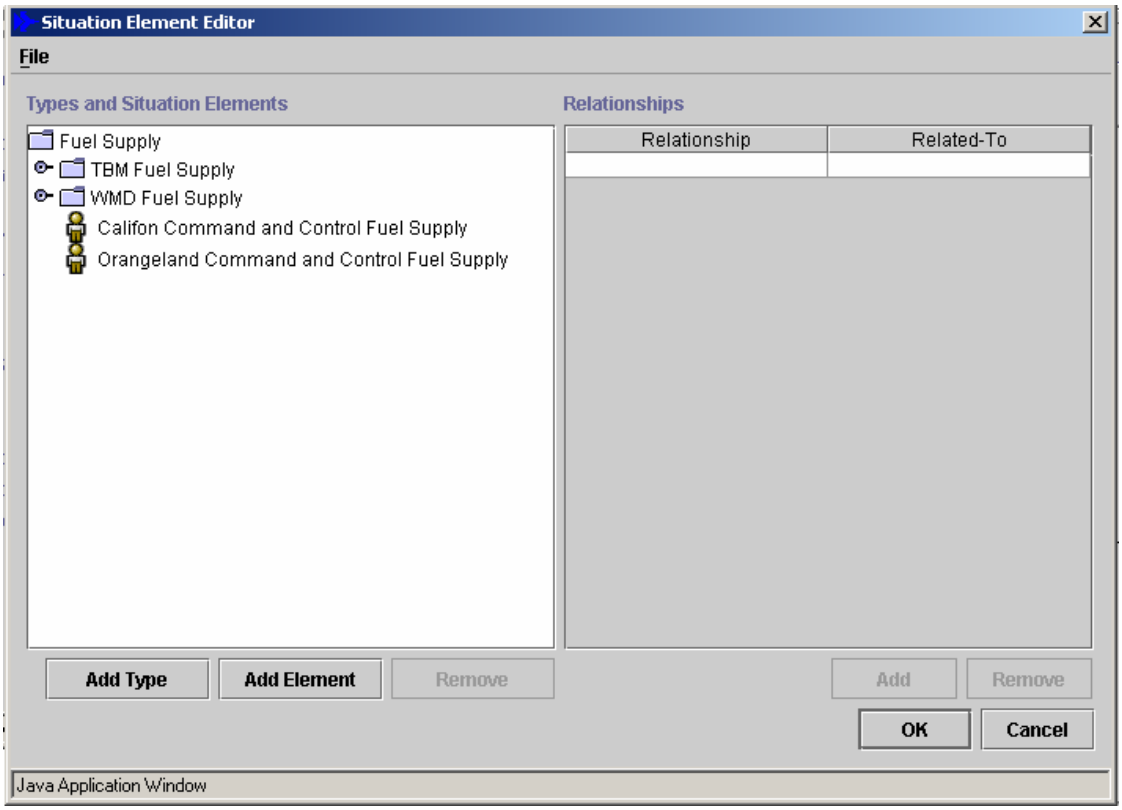

Figure 9. Situation Element Editor

Figure 10 illustrates adding new situation elements and new situation element types. Note that in Figure 11, the newly added type and instance now appear in the template application wizard.

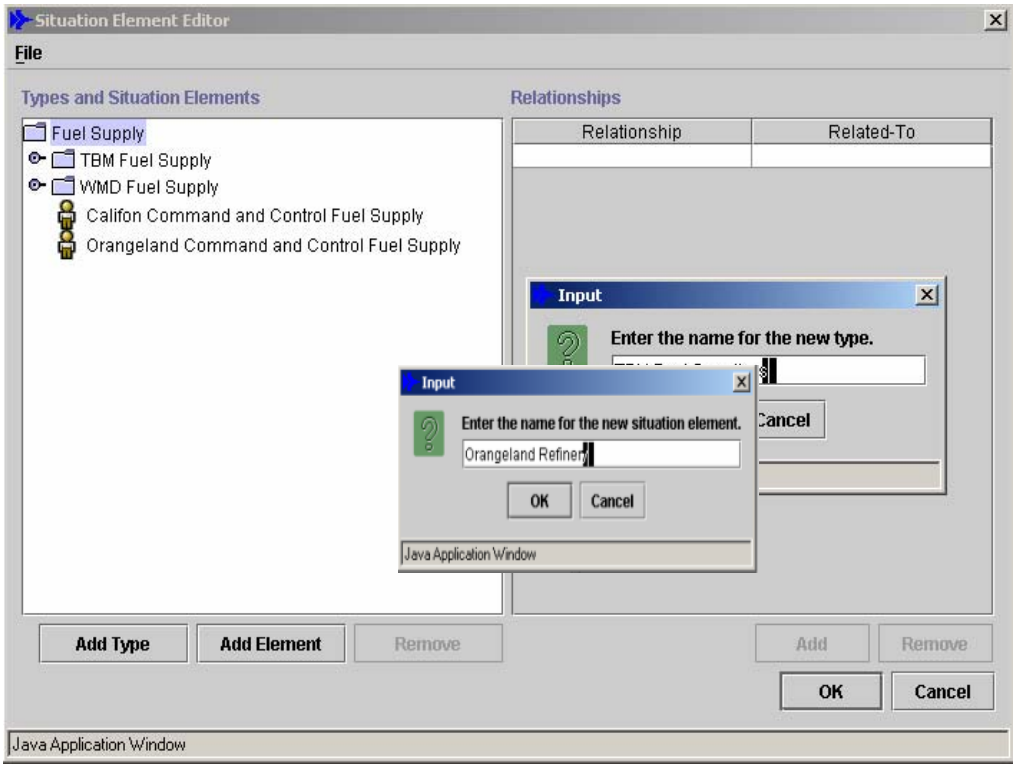

Figure 10. Situation Element Editor with Add Type and Add Element Dialogs

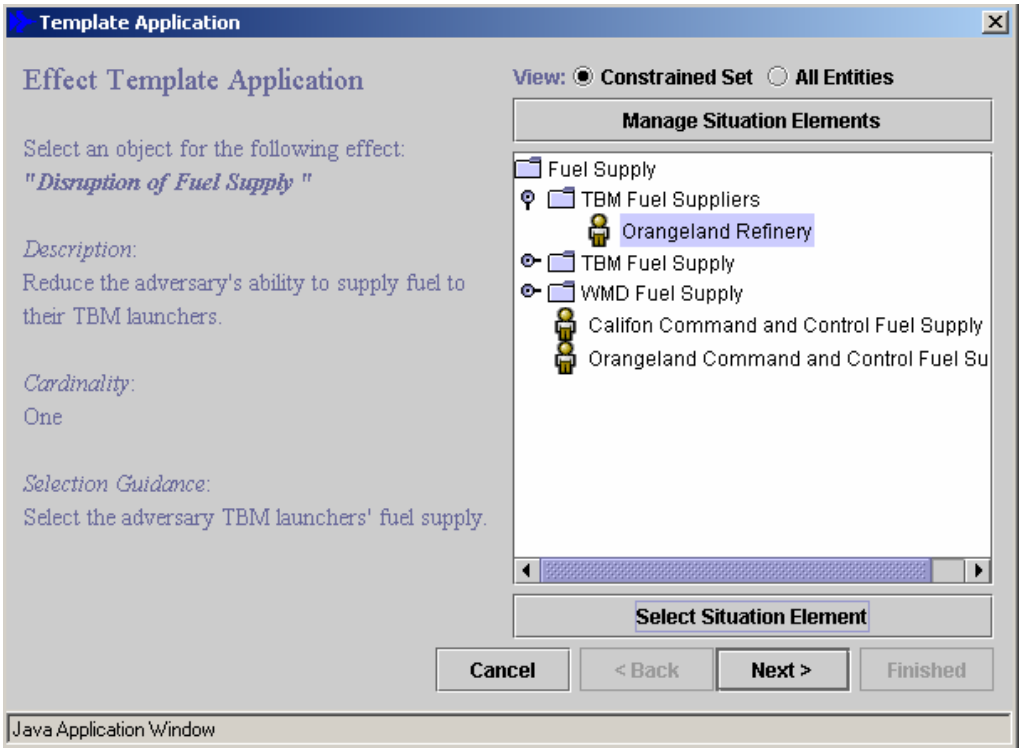

Figure 11. Template Application Wizard with New Situation Elements

6.2.5 Instantiation of Plan from Strategy Template

The Wizard completes mapping the template or templates to planning battlespace. It should be noted that there continues to be a level of abstraction available as required. Eventually ontologies will link MIDB entities, such that specific locations, BE numbers will be available to the planners. The plan that results from instantiating the strategy template in the examples above is shown in Figure 12. This plan can be further edited within Effector, or can be saved and shared with other SDT tools.

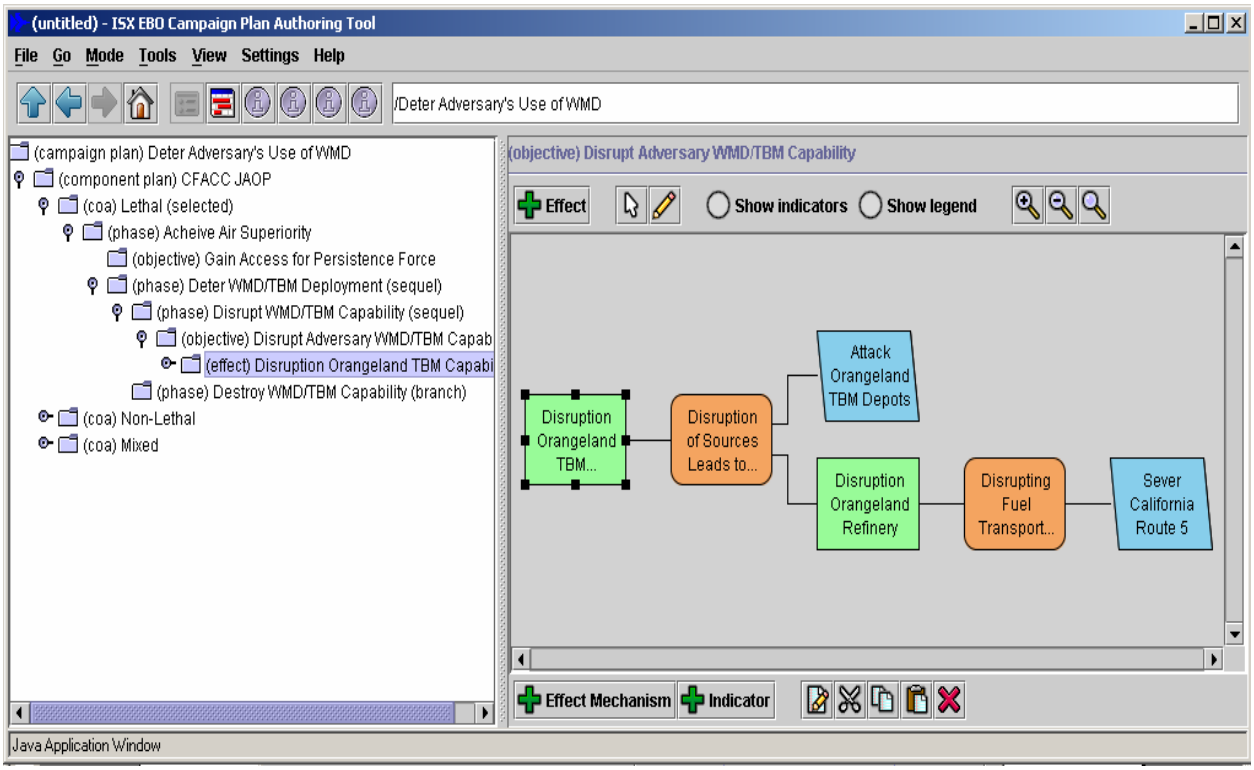

Figure 12. ISX Effector Displaying Instantiated Plan

6.3 Ontologies for Strategy Templates

Management of the abstract types of situation elements referred to in strategy templates is supported by domain ontologies that represent the types of effects, mechanisms, actions, and situation elements available, as well as the legal relationships between each of those types. For example, the ontologies specify which types of mechanisms can produce which types of effects and which types of effects can be achieved against which types of situation elements. The base ontology that specifies the general relationships between each of the effects-based terms is illustrated in Figure 13.

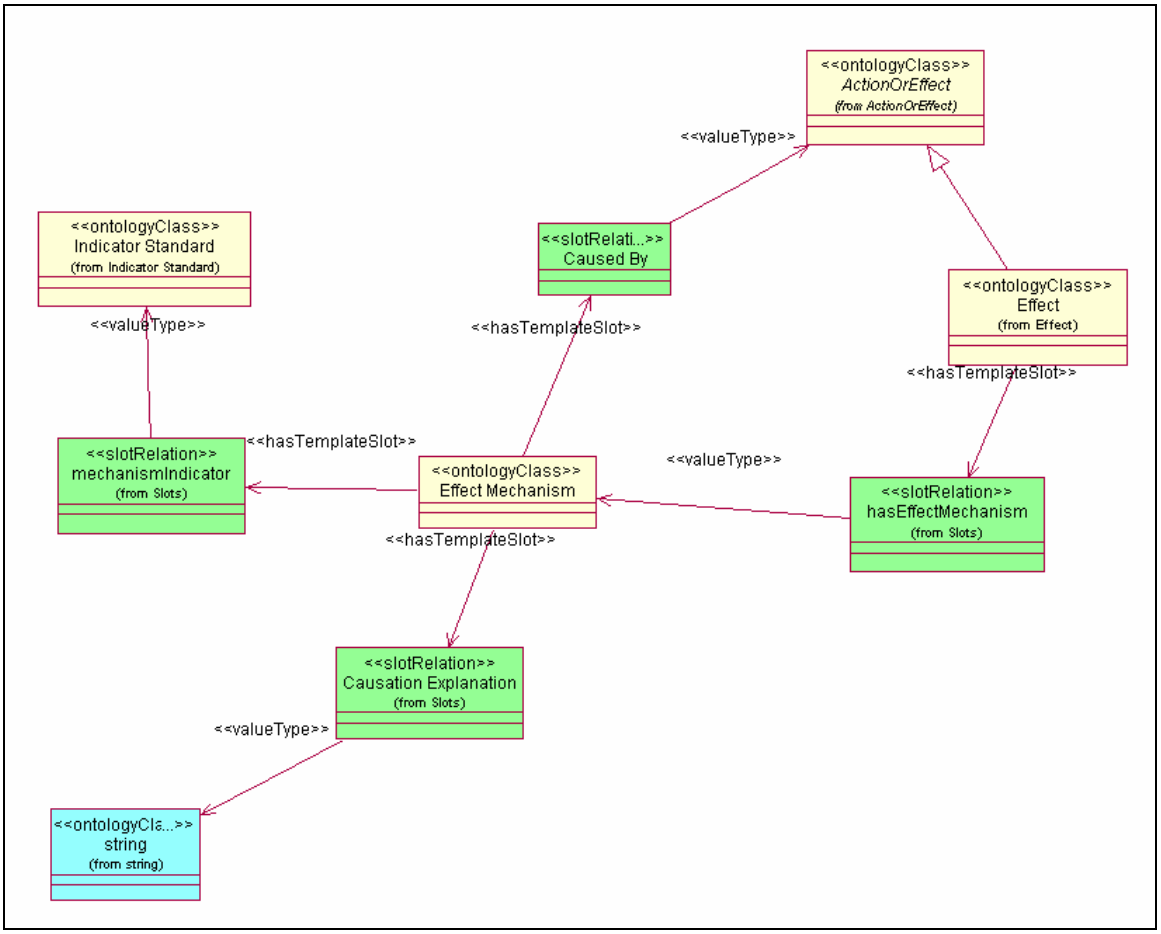

Figure 13. Base EBO Ontology

The complete semantics that we have captured and applied to the EBO planning process are represented in the base ontology and in a series of detailed ontologies that elaborate on the types and relationships that exist. For example, a detailed specification of the types of battlespace entities is captured in the situation element ontology illustrated in Figure 14.

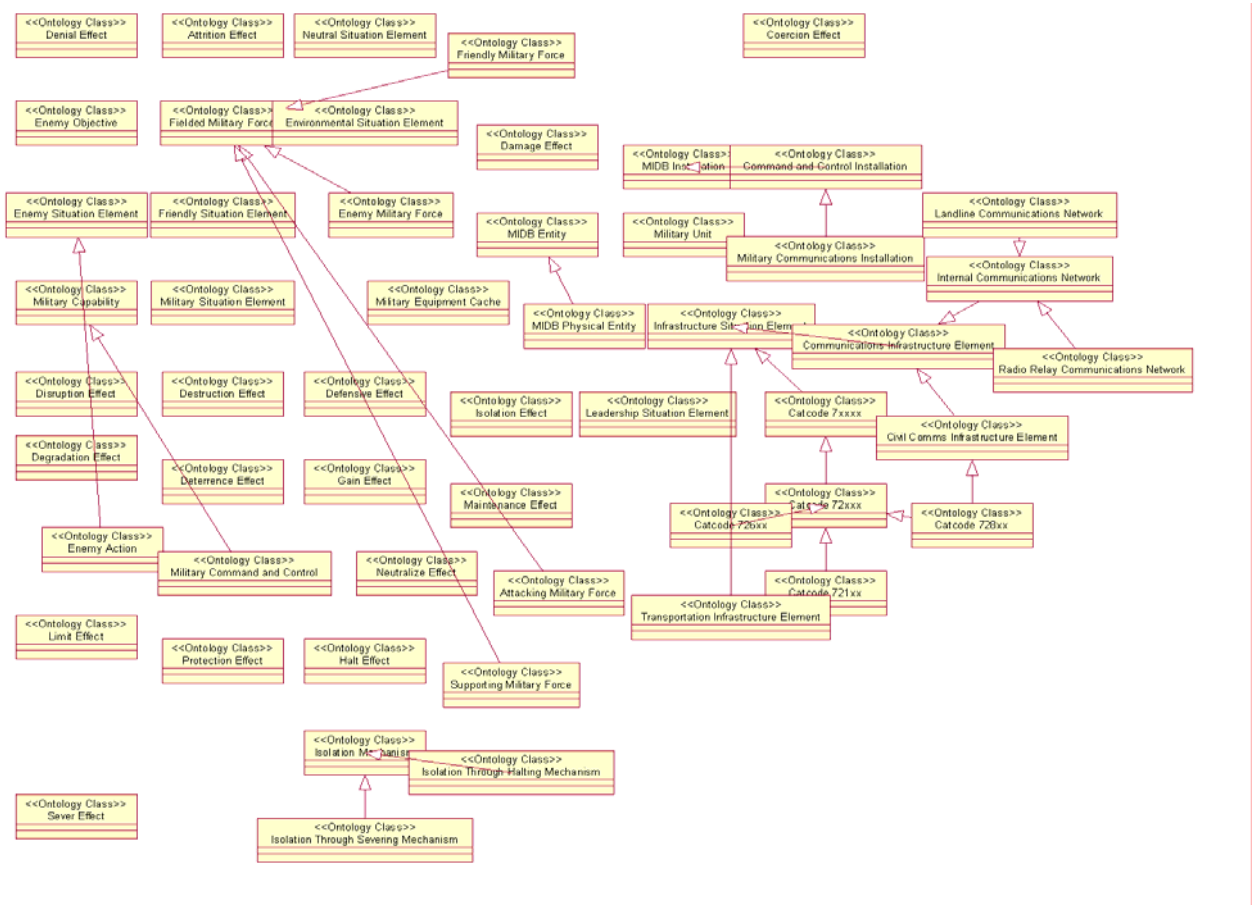

Figure 14. Situation Element Ontology

The ontologies used for the Strategy Template work is based on the work reported in CDRL A002 Contract F30602-01-C-0050: Technical Information Report: Effects Based Operations Ontology, Version 1.0, draft 12 February 2003. Note that the information captured in the ontologies continues to evolve as our EBO research continues.

7. Conclusions

ISX has researched how to construct strategy templates, how to organize them, how to apply them, and what sort of strategies can effectively be represented as templates. We have built and delivered working software components that represent the results of what we have learned, and continue to host demonstration versions of the software at http://ebo.isx.com.

The domain analysis, capture of domain semantics in ontologies, and application of those semantics in our Ontology Service that began in our EBO SBIR effort has continued in this effort. This approach has proven most effective at capturing the abstract types that the strategy template model depends upon, and organizing known information about the battlespace and presenting appropriate sets of information to the planner making use of a strategy template.

We have investigated the construction of generic doctrinal templates that capture high-level strategic goals such as attrition or denial. However, this approach has proven ineffective. Strategy templates have proven very successful at capturing strategies that can be decoupled from the situation in which they are applied, but where the specific mechanisms and methods for achieving goals such as attrition, denial, or strategic paralysis are maintained.

ISX has performed and is continuing to perform research and development that is putting effects-based planning and advanced capabilities such as strategy templates into practice. Our work has demonstrated the benefits of military planning tools that incorporate effects-based concepts not just as an afterthought, but as an integral part of their design.

8. Recommendations

There is limited value in any air operations tool that addresses only a part of the air operations plan. JFACC Planning Tool (JPT), for example, addressed only strike tasks. ISX is currently working with other providers of information ops and defensive plans that provide objective-decomposition strategy-to-task models for those areas of coverage. What is really needed is an integrated view that allows the planner to consider, decide upon, and represent all the types of tasks necessary to support an air campaign, and all of the dependencies and sequencing constraints that link it to other campaign elements. These tasks must include collection tasks, defensive tasks, non-air tasks, defensive air tasks, escort and recce tasks, etc. We recommend continued Strategy Development Tools designed to interoperate effectively with such models, to pull in their analysis and link it into the overall effects-based plan.

We also recommend taking Strategy Development Tools, specifically Strategy Templates, to planners in the field. This is difficult because planning for effects-based operations requires unique skills; authoring strategy templates will require these skills be applied in new ways. The methodology or CONOPS using Strategy Templates does not exist today, and must be evolved.

Appendices

A. References

1. D. Deptula, "Effects-based Operations: Change in the Nature of Warfare", Aerospace Education Foundation, Defense and Airpower Series, 2001.
2. D. Fayette, **"**Effects-Based Operations", http://www.afrlhorizons.com, June 2001.
3. M. McCrabb, Concept of Operations for Effects-Based Operations, 2002.
4. J. Evans, S. Graham, E. Jones, N. Pioch, M. Prendergast, C. White, "Strategy Development for Effects-Based Planning", Military Operations Research Society's Workshop of Analyzing Effects-Based Operations, 2002.
5. J. Donnelly, G. Edwards, P. Haglich, J. Ito, K. Olin, T. Padgett, "Effects-based planning with strategy templates and semantic support," SPIE Proceedings, AeroSense 2003 Vol. 5091, 2003.

B. Guide to Strategy Templates on ebo.isx.com Site

The ISX Effects-Based Operations web site is found at http://ebo.isx.com/. It is organized into multiple parts: 1) Information about on-going EBO research and development at ISX, and 2) Web-based EBO tools (in prototype and evolving development stages) that are available for users, and 3) Strategy Templates. As a development and prototyping site, the content of this site will be evolving. It is possible that the site will have changed since this report was submitted. Please contact ebo@isx.com for additional support.

System Configuration Requirements: The EBO web site is available only through a Microsoft® Internet Explorer Web Browser (version 5 or later). Netscape (version 3 or older) and older versions of Internet Explorer do not support the applets employed by the site.

EBO Web Site Navigation: The EBO web site has been designed with standard web layout concepts. A table of contents in the left frame of the main site is used for primary site navigation. Elements of the table of contents are described below.

1) News: http://ebo.isx.com/ . Main page highlighting EBO research events at ISX.
2) Schedule: http://ebo.isx.com/schedule/ . Current development schedule information.
3) Files: http://ebo.isx.com/files/ . An archive of ISX publications (internal and external) that support EBO research.
4) Links: http://ebo.isx.com/links/. Links to other EBO related sites.
5) Plan Authoring: http://ebo.isx.com/authoring/ . The latest plan authoring tools are available through this link. In order to enable the quickest download of the EBO Plan Authoring applet, the Java Runtime Environment (version 1.3.1) must be downloaded (http://java.sun.com/j2se/1.3/jre/) and installed on the client machine. Plan authoring tools contribute to Effector System under development in a SBIR Phase II Contract.

6) Strategy Templates: http://ebo.isx.com/strategytemplates/ . Provides user with the strategy template shopping cart, followed by Template Application Wizard. Examples in report are located in AETF library.

C. List of Symbols, Abbreviations, and Acronyms

AETF	Air Expeditionary Task Force
AFRL	Air Force Research Laboratory
AMC	Air Mobility Command
ATD	Advanced Technology Demonstration
C2	Command and Control
CDRL	Contractor Data Requirements List
COA	Course of Action
COGI	Center of Gravity Identification
CONOPS	Concept of Operations
COTS	Commercial Off The Shelf
CVS	Concurrent Versions System
DAML	DARPA Agent Markup Language
DARPA	Defense Advanced Research Projects Agency
EBO	Effects-Based Operations
GOTS	Government Off The Shelf
GSTF	Global Strike Task Force
GUI	Graphical User Interface
JAOPD	Joint Aerospace Operations Plan Development
JESS	Java Expert System Shell
JPT	JFACC Planning Tool
MIDB	Modernized Integrated Data Base
OER	Operational Environment Research
OD	Objective Determination
SBIR	Small Business Innovative Research
SDT	Strategy Development Tool
SI	Strategy Identification
SOAP	Simple Object Access Protocol
W3C	World Wide Web Consortium
XML	eXtensible Markup Language